

SECTION III

SANITARY SEWERS

3.01 Scope

The work included under this section consists of furnishing all labor, equipment and materials necessary for the construction of sanitary sewers, sewer connections and appurtenances as shown on the drawings or specified herein.

3.02 Excavation, Trenching and Backfilling

All sewers, sewer connections, manholes and other appurtenances shall be constructed in accordance with the applicable portions of Section II, "Excavation and Backfill for Utility Systems."

3.03 Materials

A. Vitrified Clay Pipe, Fittings and Specials

Shall be "extra strength" conforming to ASTM Specifications C-200. Pipe, fittings and specials shall be "Uniloc", manufactured by United States Concrete Pipe Company and shall be delivered to the site fitted with chemically inert Polyvinyl Plastisol, multiple ring seal type, compression gasket joints.

B. Concrete and Reinforcing Steel

Shall conform to the specifications therefor as noted on the Contract Drawings.

C. Castings

Castings for manhole frames, covers and other items, shall conform to the ASTM "Standard Specifications for Gray-Iron Castings", latest edition. Castings shall be true to pattern in form and dimensions and free of pouring faults and other defects in positions which would impair their strength or otherwise make them unfit for the service intended. The seating surfaces between frames and covers shall be machined to fit true. No plugging or filling will be allowed. Casting patterns shall conform to those designated on the drawings, or equal, as approved by the Engineer. All castings shall be of guaranteed design for wheel loads of 10,000 pounds plus thirty percent (30%) impact. A pick hole shall be provided in each cover and shall project only halfway through the cover. Covers with pick holes extending clear through will not be accepted.

D. Brick

Brick for manhole construction shall be dense, hard burned, common clay brick conforming to ASTM Specification C-62, except that brick absorption shall be between five (5) and twenty-five (25) grams of water absorbed in one minute by dried brick, set flat face down, in one eighth inch (1/8") of water.

E. Cement Mortar

Cement mortar for manhole construction shall be one part cement and two parts clean sharp sand to which may be added lime in the amount of not over twenty-five percent (25%) volume of cement. It shall be mixed dry and then wetted to proper consistency for use. No mortars that have stood for more than one hour shall be used.

3.04 Laying Pipe

The sewer trench shall be prepared to receive the pipe in accordance with Paragraph 2.03 "Excavation." A continuous trough for the pipe barrel and recesses for the pipe bells shall be excavated by hand digging so that, when the pipe is laid in the trench, true to line and grade, the pipe barrel will receive continuous uniform support and the bell will receive no pressure from the trench bottom.

The interior of all pipe shall be thoroughly cleaned of all foreign material before lowered in the trench and shall be kept clean during laying operations by means of plugs or other approved methods.

Pipe laying shall proceed up grade with spigot ends pointing in the direction of flow. If the maximum trench width, as scheduled on the drawings, is exceeded the Contractor shall install such shoring, concrete cradling or encasement as may be required to support the load of backfill.

Under no circumstances shall pipe be laid when trench conditions or the weather is unsuitable for such work, except by permission of the Engineer. At all times when work is not in progress, the exposed ends of all pipes shall be fully protected by a board or other approved stopper to prevent earth or other substances from entering the pipe. Any pipe which is disturbed or found to be defective after laying shall be taken up and relaid or replaced.

Before pipe is joined, gaskets shall be cleaned of all dirt and stones and other foreign material. The spigot ends of the pipe shall be lubricated lightly with a lubricant specified by the pipe manufacturer and approved by the Engineer. Sufficient pressure shall be applied to the pipe so as to properly seat the socket in the bell of the pipe.

3.05 Manholes

Manholes shall be constructed of specified brick and cement mortar, with cast iron frames and covers, in accordance with the details shown on the drawings. All brick shall be thoroughly wet before laying up and shall be laid with a shove joint in full mortar beds and shall be thoroughly slushed up with mortar at every course.

Where shown on the drawings, the Contractor shall place stub-outs for future extensions. The manhole ends of all such stub-outs shall be closed with approved stoppers and sealed leak-proof with a bitumastic sealing compound.

Outside drop connections shall be made in accordance with the details shown on the drawings.

The invert channels shall be smooth and accurately shaped to a semi-circular bottom conforming to the inside of the adjacent sewer section. Steep slopes outside the invert channels shall be avoided. Changes in size and grade shall be made gradually and evenly. Changes in the direction of the sewer or entering branch shall be a smooth curve with radius as long as practicable.

All manholes shall be plastered inside and outside with one-half (1/2) inch thickness of cement mortar.

Manhole frames and covers shall be furnished and installed under this section. Frames shall be set to the finish paving grade, or to rim elevations shown on the drawings.

3.06 Additional Work

Additional items of construction, including service connections, concrete pipe encasement, pipe supports, cleanouts, drop connections, special manholes and other items necessary for the complete installation of the system shall conform to specific details on the drawings and shall be constructed of first class materials conforming to the applicable portions of these specifications.

3.07 Tests, Inspections and Acceptance

A. Clay Pipe

Used in this work shall be tested in accordance with ASTM Specifications C-301, latest edition. Certified records of the tests made by the manufacturer, or by a reliable commercial laboratory, or both, shall be submitted with each shipment of pipe if required by the Engineer. All pipe will be inspected upon delivery and that which does not conform to the requirements of these specifications shall be rejected and must be immediately removed by the Contractor. The Contractor shall furnish and provide all labor necessary to assist the

Engineer in inspecting the material.

B. Workmanship

It is imperative that all sewers and appurtenances be built practically water-tight and that the Contractor adhere rigidly to the specifications for materials and workmanship. All of the sewage must be pumped for disposal and special care and attention must be paid to securing water-tight construction. Upon completion, the sewers, or sections thereof, will be tested and gauged and if infiltration or exfiltration is above the allowable limits specified, the sewer will be rejected.

C. Inspection

On completion of each block or section of sewer, or such other times as the Engineer may direct, the block or section of sewer is to be cleaned, tested and inspected. Each section of the sewer is to show, on examination from either end, a full circle of light between manholes. Each manhole, or other appurtenance to the system shall be of the specified size and form, be water-tight, neatly and substantially constructed. All repairs shown necessary by the inspection are to be made; broken or cracked pipe replaced; all deposits removed and the sewers left true to line and grade, entirely clean, and ready for use. Final acceptance and approval will not be made until the overlying pavement is completed. Should damage occur during paving operations, the Contractor shall repair said damage at no cost to Owner.

D. Limits of Infiltration, Exfiltration and Testing

The allowable limits of infiltration, or exfiltration, or leakage, for the entire system, or any portion thereof, including house service lines, shall not exceed a rate of 200 gallons per inch of diameter per mile of pipe per 24 hours. The allowable limits of infiltration or exfiltration of manholes shall not exceed a rate of 4 gallons per manhole per 24 hours.

Any part or all of the system may be tested for infiltration or exfiltration, as directed by the Engineer. Prior to testing for infiltration, the system shall be pumped out so that normal infiltration conditions exist at the time of testing. The amounts of infiltration or exfiltration shall be determined by pumping into or out of calibrated drums, or by other approved methods.

Tests shall be conducted on portions of the system not exceeding three manhole runs or more than 1000 feet of main sewer, or as otherwise directed by the Engineer. Tests shall be run continuously for three hours. Where infiltration or exfiltration exceeds the allowable limits specified herein, the defective pipe, joints or other faulty construction shall be located and repaired by the Contractor. If the defective portions cannot be located

the Contractor shall remove and reconstruct as much of the work as is necessary in order to conform to the specified allowable limits.

Upon completion of the work, if so directed by the Engineer, a test shall be made of the entire system, or major portions thereof. Previous satisfactory test results of minor portions of the system shall not relieve the Contractor of the responsibility of construction of the entire system within the specified allowable limits.

The Contractor shall provide all labor, equipment and materials and shall conduct all testing required, under the direction of the Engineer. No separate payment will be made for this work and the cost for this work shall be included in the unit price quoted in the Proposal for the applicable item of work.